

Tufted Titmouse Dynasties in Illinois

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ABSTRACT

At my Illinois banding station I color-banded 198 Tufted Titmice (*Baeolophus bicolor*) from 1967 through 2000 and studied them until the last disappeared in 2003. Two birds remained paired year-round for 54 mos and others maintained pair bonds for at least 24 mos. Sequences of missing mates being replaced and fledglings succeeding their parents in subsequent nesting seasons resulted in continuous dynasties of 177, 132, 121, and 86 mos. Among 42 recognized pairs, a single divorce was evident. Parental attachment for 71% of banded fledglings ended within three months, but on eight occasions a single fledgling remained with one or both parents into early the next year. A few young dispersed up to 0.8 km and one was seen 6.4 km away. The oldest repeating male was 10+ yr old and the oldest female 5+ yr. Those reaching adulthood had a further life expectancy of 1.8 yr and the annual disappearance rates up to 5 yr ranged between 35 - 47%.

INTRODUCTION

Between 1967 and 2000, I color-banded 198 Tufted Titmice (*Baeolophus bicolor*) in east-central Illinois and recorded their activities year-round until Apr 2003. My initial plan was to observe the initiation, duration, and termination of pairing in this species and the size and duration of family units. Gradually, I accumulated data on the sequence of pair members linked into dynasties, the occurrence of divorce, the dispersal of juveniles, and limited survivorship statistics.

Although extensive research has been conducted worldwide on some Paridae members, long-term Tufted Titmouse studies have been rather limited. Life histories were published by Laskey (1957), Pielou (1957) and Brackbill (1970) with docu-

mented summaries by Bent (1946) and Grubb and Pravosudov (1994). Other papers will be cited in later discussion.

STUDY AREA AND METHODS

My banding station on a residential lot at the edge of Charleston (39°30' N, 88°11' W) was bordered on two sides by a young riparian woodland along two converging drainage creeks with farm fields beyond gradually replaced by residences. Birds coming to feeders or traps near my home crossed a wide lawn with scattered trees and shrubs they used for perches.

Several Potter traps also served as open feeders year-round and mist nets were used infrequently. Each bird was banded with a U.S. Fish and Wildlife Service band and two plastic color bands on right-left leg combinations. Color band loss or discoloration seldom occurred and was usually replaced. I aged new captures as AHY (after hatching year), HY (hatching year), L (local) or U (unknown) using criteria in Wood (1969). A few nest box broods were banded and other L birds were trapped when they accompanied their parents. For sex determination at initial capture wing chords of <76 mm were designated as females, 76 - 79 mm as unknown, and >79 mm as males. Later contacts that revealed brood patches in females or cloacal protuberances in males, crouch with wing-flutter solicitation in females or courtship feeding by males, or pairing with another of known sex were used to verify or correct and to assign sex for those previously listed as U. I considered a pair bond to exist not only when two birds shared reproductive activities but also when they were seen together for extended periods. Often that involved repeated arrivals or departures together from a feeder or perched side-by-side while opening seeds.

RESULTS

Between Oct 1967 and Dec 2000, I banded 43 AHY, 63 L, 56 HY and 36 U titmice. Beginning in 1969, I recorded their activities on 3,799 dates during 410 of the 427 mo until the study ended in

Apr 2003 with the disappearance of the last marked bird. On 60% of those days I noted at least one pair present. In May males usually appeared alone, with their mates probably attending nests. Of all birds banded, I saw 104, mostly immatures, in only single calendar years.

My first two titmice, M-623 (male) and F-624 (female), were among the longest-lived and were paired for the longest continuous interval of 54 mo in my changing population. During that time, I saw 61% of these days they appeared together. In Apr 1972, F-624 was last seen at a feeder with her mate and 13 d later M-623 was joined by a new bird with a brood patch that I banded as F-792. Thus continued a sequence of 11 linked pairs extending for 177 mo and producing 11 broods of 35 fledglings that I refer to as a dynasty (Fig. 1). Because my yard is only a small part of a normal titmouse home range, numbers and dates throughout this paper represent minimum values.

Within this dynasty, the only certain divorce occurred. After raising two broods together, F-922 left M-970 and joined M-080 (an AHY bird I first saw on 13 Apr) on 19 Apr. M-970 lingered into May but was driven off by the new mate and was never seen after 14 May. Within 4, 3 and 7 d after their mates disappeared, other females were joined by new males, perhaps floaters in the very small population that usually visited my yard except at least one at a feeder or trap on 322 dates, and one when new broods were present. To replace a missing mate, most males took considerably longer; in three instances, M-940 made repeated visits alone over 2, 2 and 4 mo before appearing with a new partner.

The only time I observed initial pair formation involved two HY birds banded in Sep 1982 when they were about 4 mo old. That October they came to my feeder together and repeated that behavior frequently during the next 40 mo. They were my most successful pair bringing with them three, two and six fledglings in successive years. In Jan 1986, the female disappeared and 2 mo later the male was also gone, but a male from their third brood continued a second dynasty by pairing with a sequence of four mates over a 64-mo span with two nests in my nest boxes destroyed and four fledglings observed. A male from his last brood and

its mate for two years brought two fledglings, the last of which was not seen after Sep 1993. This dynasty of nine adults in six pairs over 132 mo brought 17 progeny to my yard.

I traced two other dynasties containing at least 10 pairs for 121 mos and five pairs linked for 86 mo. Neither of these dynasties brought many young with them; and in 10 of the nesting seasons, no nests were known to succeed. Throughout my study I recognized 42 pairs ranging in duration from 2 mo (the female disappeared after nest building began) to 54 mo and 22 of these produced at least 30 broods and 79 fledglings.

To quantify the duration of fledgling association with parents, I examined the last date that 59 color-banded young in 21 broods were seen with a parent and the final record I had for each. Of the 58 banded in June, July or August, 41 were not with a parent after September. A September-banded bird followed its parent until late October and was never seen again. Of the remaining 17, the attachment of nine ceased before year-end, but eight others maintained parental ties twice into January, twice into February, three times into March and the last into late April. Of the original 59, 24 never visited my yard again after leaving a parent, but six still came two to six years later, and five others were later seen away from the banding site.

Over the years, I devoted limited effort to finding marked birds away from the banding station but several feeder watchers reported color codes to me. Together we identified 14 individuals that had dispersed up to 0.8 km (0.5 mi) radius and never returned. Only three were AHY birds when banded. Of the group, five went north, two east, one southeast, one southwest, two west and three northwest even though a wooded corridor only extended east and west from my yard. An HY bird I banded on 26 Jul appeared at a feeder 738 m (2,400 ft) NW the next day and repeated there seven times until the following April. A L bird banded in July was seen 6.4 km (4 mi) SW that November; it represented the longest known dispersal distance.

Because of the rapid disappearance of most subadults, I plotted a composite life table for those known to be at least a year old (Table 1). For this I

assumed all L, HY, and U birds were dated from the current 1 Jun and had to reach the next 1 Jun to be included. AHY birds when banded were assumed to date from the previous 1 Jun. This procedure matches Clapp et al. (1983) even though it underestimates the ages of some individuals. From the table, I used formulae in Krebs (1972) to calculate the further life expectancy of adults at least one year old to be 1.8 yr. Among 28 males, the oldest was at least 120 mo, and for 22 females the oldest was 60+ mo.

DISCUSSION

Are two titmice exhibiting site tenacity or pair-bond fidelity when they are seen together repeatedly in a specific area for a prolonged time interval? These two concepts are not mutually exclusive but evidence of multi-month association coupled with repeated breeding offers strong support for the latter interpretation. Regarding the Tufted Titmouse, Ens et al. (1996) expressed an opposing opinion by singling out two jay species as the only ones maintaining continuous partnerships in North America, and Matthysen (1990) did not list it

Table 1. Estimated age distribution in years of 64 adult Tufted Titmice at last record. l_x = number alive; d_x = number disappearing; q_x = "mortality" rate.

| x | l_x | d_x | q_x |
|---------|-------|-------|-------|
| 1 - 2 | 64 | 30 | 0.47 |
| 2 - 3 | 34 | 14 | 0.41 |
| 3 - 4 | 20 | 7 | 0.35 |
| 4 - 5 | 13 | 6 | 0.46 |
| 5 - 6 | 7 | 4 | 0.57 |
| 6 - 7 | 3 | 2 | 0.67 |
| 7 - 8 | 1 | 0 | 0.00 |
| 8 - 9 | 1 | 0 | 0.00 |
| 9 - 10 | 1 | 0 | 0.00 |
| 10 - 11 | 1 | 1 | 1.00 |

among species paired for life in his review of social organization in parids. Nevertheless, Brackbill (1970, 1987) in his long-term study of color-banded titmice, reported findings quite similar to mine. He found 40% of 31 pairings lasted at least a year, the

Figure 1. A dynasty of 11 pairs linked over 177 months that produced 35 observed fledglings. M = male; F = female; B = broods of fledglings.

M-623 + F-624 (4 Nov 1967 - 23 Apr 1972) B = 1 + 1 + 6

↳ + F-792 (6 May 1972 - 11 Feb 1973) B = 6

↳ + M-940 (15 Feb 1973 - 14 May 1973) B = 3

↳ + F-952 (17 Jul 1973 - 30 Jun 1974) B = 1

↳ + F-867 (31 Aug 1974 - 1 Feb 1976) B = 1

↳ + F-922 (26 Jun 1976 - 29 Apr 1977) B = 0

↳ + M-970 (2 May 1977 - 15 Apr 1979) B = 3 + 2

↳ + M-080 (19 Apr 1979 - 5 Jan 1980) B = 3

↳ + M-433 (12 Jan 1980 - 14 May 1981) B = 8

↳ + F-517 (15 Jul 1981 - 2 Apr 1982) B = 0

↳ + F-533 (23 Apr 1982 - 9 May 1982) B = 0

Last seen 26 Jul 1982

longest for 40 mo. Van Tyne (1948) also observed pairs for extended intervals beyond the breeding season while Brawn and Samson (1983) considered the pair the basic unit in winter flocks.

Sequences of pairs have also been well documented. Middleton (1949) had a female successfully nesting in his boxes for seven years with three consecutive mates, and Brackbill (1987) listed one bird with five mates in 52 mo. In his 1979 paper he described a single divorce and presumed that other pairings were terminated by the death of one mate. He also commented on two immatures that paired for a prolonged period, probably by late July and definitely by late October as my HY pair had done.

Recently fledged broods usually leave their parents in a matter of days or weeks, but there are frequent examples of marked individuals with one or both parents months later (Van Tyne 1948, Laskey 1957, Tarbell 1983). In his study of winter associates, Condee (1970) preferred the term "clan" rather than "flock," because he considered it "a vestige of the family group of the previous season." Using DNA fingerprinting, Pravosudova et al. (1999) confirmed that five titmouse winter triads contained an adult pair and a related first year offspring.

Home range dimensions versus dispersal distances are difficult to distinguish. Van Tyne (1948) reported nests within 0.5 km (0.3 mi) of his station and five birds repeatedly trapped or seen within 1.0 km (0.6 mi). Condee (1970) gave maximum ranges of 732 - 915 m (2,400- 3,000 ft) in winter territories. Brackbill (1970) described a young female at his feeder from October to April that was seen 3.2 km (2 mi) away that fall, while another lingered into January and then occurred 1.2 km (0.75 mi) away in June and was still there the following year. Elder (1985) included very limited data from the Bird Banding Laboratory (BBL) on short dispersal distances.

Interpreting population vital statistics is subject to various biases. Loery et al. (1987) stated "there is no way to distinguish between mortality and dispersal in capture-recapture studies unless marked individuals can be trapped at other locations," to which I would add "or can otherwise

be located." When comparing studies, problems are posed by differing baseline dates as well as by sexes and age classes separated or pooled. I followed Clapp et al. (1983) who assumed a hatching date of 1 Jun and reported the oldest BBL record for Tufted Titmouse of 13 yr 3 mo based on 81,727 records. Other longevity records included a female of Middleton (1949) that was >7 yr old, a nestling banded by Laskey (1957) was 6 yr 3 mo when last seen, and Elder (1985) reported his oldest bird was 10+ yr old, the same as mine. In Brackbill's (1970) population that had reached their first March, the oldest male survived 67 mo after that date and the oldest female 58 mo. Elsewhere he said his oldest male reached 6 yr 4½ mo if hatched on 15 May.

Estimates of average annual mortality and expected life spans are influenced by the populations sampled. When birds are defined as "adults" on 1 Jan or 1 Mar, the fate of inexperienced birds not yet a year old may well differ from those reaching 1 Jun. Again, using 1 Mar as his starting point, Brackbill (1970) found the average male lived 15 additional months and the average female 22 mo. Franks (1975) used BBL data for L, HY and SY birds that reached their first 1 Jan to calculate future life expectancy of 1.17 yr for those reported dead and 1.08 yr for those reported alive. Elder's (1985) life table for resightings showed survival rates of birds in their second, third and fourth years, very similar to mine. From it he calculated a mean yearly survival of 62% and mean life span of 2.1 yr. Karr et al. (1990) gave mean annual survivals of 54% and 53% from recaptures in separate populations.

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